Notes for CURSOR #11

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CURSOR™
Programs for PET™ Computers

"If it was so, it might be; and
if it were so, it would be; but
as it isn't, it ain't. That's logic."
- Lewis Carrol

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A CURSORY GLANCE

During mid-June I visited the Commodore plant, and had an enjoyable and interesting afternoon. As you might guess, the 2040 disk system was discussed during my visit. Commodore is aware that they need to make the 2040 easier to use. In the near future, this will be done with the "wedge" program that I mentioned last month. I have been able to use the "wedge" for a while now, and find that it does make life with the 2040 much more pleasant. But, it has some warts all its own, some of which are serious. The good news is that once you bring the wedge in and run it, you can pass commands to the disk quite easily. For example, with the wedge, you can initialize a disk by typing ">I0". (Wherever I use ">", you could also use "@", which is more convienient on the CBM style keyboard.) There are a couple of other special wedge characters: "/" followed by a filename Loads that file, and the up-arrow "↑" first Loads, then Runs a program. With the wedge, you can examine the directory of a disk without wiping-out the program that is currently in memory. If that sounds mundane, you'll have to realize that the 2040 command "Load $0",8 in fact loads the directory as a file, and clears memory in the process! Programmers have been known to commit suicide over lesser problems. The second feature of the wedge is that when you get an error on the disk system, you can query the 2040 for the disk error message by just typing ">" followed by a return. Important point: the Pet was designed to have general I/O capabilities, especially emphasizing the IEEE 488 bus, which is designed for use with "smart" peripheral devices. However, and this is a biggie, no disk-specific "hooks" were built-in to the Pet operating system. Example: most disk systems will report back to the console when there has been an error in a disk operation. But not Pet: it send commands and data off to the 2040 via the 488 bus. The Pet itself never knows when an error has occurred. You are expected to look at the red LED indicator on the 2040 and find out that an error has happened, and then inquire of the 2040 just what sort of error it was.

The bottom line is that the wedge really helps a lot, but does not represent the ultimate answer, at least in my opinion. The version that I have tested does not know the difference betweeen command mode and data input via a Get statement. As you might guess, this can lead to exciting results when you type a "/" as part of input data! (The wedge sees the character, and tries to go off and load a file). I expect that they will be able to correct that problem before the wedge is released. In the long run, my guess is that Commodore will develop a more sophisticated user interface with the 2040 disk system. Later in these Notes you'll read about the Programmer's Toolbox that Palo Alto ICs is selling. I imagine that Commodore might be able to adopt a similar extension to the original Rom set that would provide a convienient set of commands for the disk.

As far as the reliability of the 2040 is concerned, the jury is still out. I now have a 2040 that works very well! However, I also personally know of several disk systems that have been returned to the factory for adjustments or repair. I think that two things are involved with the reliability issue. First, a disk system is more complex to make than a computer is, especially a smart disk like the 2040. The production people and the Quality Assurance folks at Commodore are probably doing everything that they can to alleviate the problems as they become known. But it takes time to work everything out, and it takes experience. Remember also - the same crew had to bring a printer manufacturing capability on line at about the same time as the disk.

As with many new products, the disk also has some design glitches. It is quite normal for design changes to take place as field experience with a product is accumulated. It is not always simple to decide how to resolve some of these problems. Take the heat situation with the 2040. (Every 2040 I have seen runs very damn warm. There are folks at Commodore that think I have made a big issue out of something that isn't a demonstrated problem. I'll admit, it is hard to "prove" that the temperature that the 2040 runs at causes any of the problems we have seen. but somehow I feel nervous when I take diskettes out of drive one and they are very, very warm to the touch.) However, it isn't easy for the engineers to decide how to get the unit to run cooler. The obvious answer of installing a fan can produce problems that might be worse than the heat! Dust is a real problem with floppy media. A fan that doesn't circulate filtered air may cause problems by moving the dust around, and getting a bunch of junk on the media that wouldn't have gotten there otherwise. Also, the fan will increase the cost of the unit, as well as give you another electro-mechanical component to fail. So, they are also looking at "passive" (i.e. non-fan) solutions, such as better venting and decreasing the amount of heat that is generated.

One strong impression that I came away with is that Commodore has a number of very bright, talented technical people. (Chuck Peddle is the best known, and he deserves a great deal of credit for having the vision, way before most others, that a single board computer could be packaged as an appliance.) But there are many other technical folks at Commodore, both hardware and software who also deserve a lot of praise. I knew the company was in good hands when one of the top engineers took me aside and demonstrated a music interface that he had developed for himself! (Of course, I think music is one of the more creative uses for these little machines).

CURSOR #11 HAS THESE PROGRAMS:	
COVER	A fireworks display - by Glen Fisher.
DEMON!	Use joysticks (or the numeric pad) to capture the Demon. (Has great sound effects). By Ken Morley.
HI CALC	A high precision calculator. 120 digits on old rom, 8k Pets, and 684 digits on new rom 16k machines. By Glen Fisher.
WIPEOUT	Roll the dice and try to eliminate the 12 numbers. By Sheila Dolgowich.
PEG	A clever pegboard game. When you give up, have the Pet solve it! By Julia Hallford.
STATES	Learn the states and capitals of the U.S. By Art Carpet.

MORE ABOUT THE PROGRAMS

DEMON! - by Ken Morley. Demon! (the exclamation point means it uses sound...) is a delightful piece of entertainment where a little demon pops up at random, and your task is to catch the beast. This game uses joysticks for input, if you have them, otherwise you can use the numeric pad. The Cursor joystick routine, written by Glen Fisher, is designed to work with all three of the dual Atari joystick adapters that we know about: Creative Software, Coyote Electronics, and Chuck Johnson. COYOTE ELECTRONICS, Box 101, Coyote, CA 95013 sells a joystick interface that also gives you a subminiature female plug for CB-2 sound. Demon! shines with the Coyote unit, since you get sound and joysticks at the same time! To use sound with the Coyote adapter, you'll need something like the Radio Shack 200mw speaker/amplifiere, catalog 277-1008 which cost about ten dollars. CREATIVE SOFTWARE, Box 4030, Mountain View, CA 94040 also sells a well-designed joystick interface. CHUCK JOHNSON, 17104 Via Alamitos, San Lorenzo, CA 94580 sells an adapter, but it requires some soldering on your part, and is not packaged in a box or enclosure, which makes it a little more vulnerable. Our software adapts to your dual Atari interface by having you put the joystick in each of the six main positions before the game starts. By doing this, we are able to work with all three units (each of which does things a bit differently!) This means that our routine will work even if you hold your joystick upside down, as long as you are consistent. Hint to non-joystick users of Demon!: you can improve your performance by using both hands. Try putting two fingers of your right hand on the 8 and 6 keys, and two fingers of the left hand on 4 and 2. Also, note that by holding the key down, you continue going the direction that you are pointed.

HI CALC - by Glen Fisher. This is a high-precision four function calculator. On an 8k Pet with the old Roms, it can do arithmetic using at least 120 significant digits, while on a new Pet with 16k it will work on about 684 digits! The exact number of digits carried depend both on what roms you have and how much memory. This is due to the array subscripting bug with the old roms. This means that regardless of how much memory you have on an old rom Pet, the most precision you can expect from Hi Calc is about 381 digits, while with the new roms, the only limitation is how much memory you have, although we limit it to 684 digits. The methods used are the same ones as for paper and pencil calculations, modified somewhat to make them suitable for use on the Pet. For details, see Donald Knuth's Art of Computer Programming, Volume 2: Seminumerical Algorithms, pages 229-245. There is added complications in Hi Calc due to the need of handling fractions (mostly trying to keep track of the decimal point). The program actually does all of its work in base 1000. This is because less memory is used by storing the numbers that way, and also because it makes it easy to correctly place commas.

For code readers, the important variables are:

A%	The accumulator where results go.
E%	The entry where typed numbers are kept.
AS,ES	The sign of A% and E%.
AI,EI	The number of "thousits" to the left of the decimal point. (I for integer).
AF,EF	The number of "thousits" to the right of the decimal point. (F for fraction).
AL,EL	The number of significant "thousits" in A% and E%. (L for length).
PR	The precision, in "thousits". Equals number of decimal digits divided by three.
PL	The number of places kept after the decimal point, also in thousits.

Numbers are kept in A% and E% with the rightmost thousit in A1(1) and E1(1), and the leftmost in A%(L) and E%(L). The combination of AI and AF keeps track of the decimal position in A%, and likewise EI and EF perform the same function for the E% array.

Whenever a number is created (or typed) that has too many significant digits, Hi Calc will print the message "ROUNDING!". The answer you get back will still be displayed as the correct magnitude, but some of the less significant digits will be zeros. When Hi Calc starts up, it is set to carry 15 or fewer decimal places on a divide operation. This protects you from waiting for 684 3's when you divide 1 by 3. You can change this limit by typing a decimal point when Hi Calc asks for an operation. You'll then be asked "What precision?', and you response will be used when dividing.If the number of places to be kept is larger than the precision, the program will calculate as many as it can store, and then round the result. Note that due to the fact that numbers are stored in base thousand that Hi Calc will only use a number of decimal places that is a multiple of three.

How, you ask, did we go about checking the results? We did two things: we tried a lot of problems that a hand calculator could handle as a way of showing that the algorithms worked, at least with small numbers. We also tried some very large problems on another computer that has a different high-precision calculator, and found that we checked out exactly.

WIPEOUT - by Shelia Dolgowich. A fun dice game that takes some thinking, as well as a fair amount of luck. You roll two dice, and then remove as many of the 12 numbers as you can. When you roll doubles, you get an extra roll, which comes in handy when you are unable to remove any numbers on a given roll of the dice.

PEG - by Julia Hallford. A classic game where you try to interchange two sets of pegs on a board. It can be done, so if you tire of trying, give zero as your move, then ask the Pet to solve the problem.

STATES - by Art Carpet. If you've always wanted to learn all of the capitals of the U.S., here is a wonderful educational excercise for you.

"The moving cursor prints and having writ goes on...
Nor all your piratry and wit will move it up
to cancel half a line."
Omar K-Ram
Quoted in the Homebrew Computer Club Newsletter
Volume 4, Issue 2 - May 1979

PROGRAMMER'S TOOLBOX - A REVIEW

I've been able to use a pre-production version of a remarkable new product for the Pet: an add-on Rom that gives you a "Toolbox" of useful functions. You get nine new commands, as follows:

AUTO provides automatic line numbering when you type in your program. It is clever enough that if you need to jump ahead, say to line 50,000 to put in a subroutine, that as soon as you edit the line number that it supplies, it starts giving new line numbers from there.

DELETE will delete a range of line numbers. How sweet it is...

RENUMBER allows you to renumber an entire program. Due to very tight limits on the amount of code they could put in the Rom, it wasn't possible to give the capability to renumber a section of a program, which would be very useful.

HELP is what you type after Basic tells you that you have a ?SYNTAX ERROR. It shows the offending line, and highlights the problem with reverse video. This is nicer than the best "big machine" Basics that I have used!

TRACE, STEP and OFF are all related commands. They can be used to follow the flow of a program to help you understand how a program works, or to aid in debugging. In Trace mode, a six-line reverse video window appears in the upper left corner of the screen. You see the line numbers that are being executed scroll by in the trace window! Just press "Shift": to slow things down. STEP is similiar, but only runs when you hold down the shift key, so that you can single step through a Basic program. OFF turns Trace or Step off.

APPEND is used to "glue" program fragments together. Note that it is your responsibility to bring things in in the right order, as it does not merge line numbers, it merely adds the second file to the end of the first file.

DUMP shows you the current contents of all simple (non-array) variables. It can really help with string variables that contain cursor commands, as you will be able to see the contents. (A Print of a string variable that has cursor control characters actually performs the movements, which can be very confusing.)

FIND will find each occurence of a string, and print those lines

If you are wondering why Commodore didn't include all this wonderful stuff in the first place, I think that you should remember that they had a total of 14k of Rom available, and while they probably didn't think of all the great things that they could have included, it was not possible to add many more features, and still stay within their cost target. (If you want to see how Microsoft helped to waste some of that precious Rom space, type "WAIT 6502,0" at your Pet keyboard...

Chuck Bond and Harry Saal and their associates have created a useful "Toolbox". The expected availablity is mid-August from: PALO ALTO IC's, 810 Garland Dr., Palo Alto, CA 94303 Cost for the 8k Pet is $74.95, which includes a board that connects to your memory expansion connector. (Be sure and let them know if you have a Skyles or Expanda-pet memory board. For the 16 and 32k Pets the cost is $49.95. California residents need to add 6% tax so that Governor Moonbeam can fly to exotic places with his girl friend, or run for President or whatever.

CURSOR CONVENTIONS FOR ROM DEPENDENT CODE

We have decided that the best approach for the problem of Rom dependent code is to do two things: first, only use rom dependent stuff when you really need it, and two - dedicate a few variables (all starting with "Q") to hold interesting addresses, and then always first PEEK to see which Pet we are on, then set the magic variables accordingly, then use those variables in all of the Peeks and Pokes.

For example, it is often handy to see what key is being pressed right now, for repeating keys, etc. Before the new roms came out, you would PEEK(515), then use that value. But, with the new roms, that location was moved to 151. In this case we propose to use the variable QP (P for key Pressed, Q for unusual name). Our method imposes no major speed penalties, and a rather small space penalty (for the assignment).

To automatically set the variables, use the following code at the front of the program:

```
100 QV=1:QM=134:QK=22
110 IF PEEK(50000) THEN QV=2:QM=52:QK=158
```

(The example isn't complete, it just shows the principle). The PEEK(50000) looks into the Basic Rom. With the old Roms, a PEEK to the Basic Roms always returned a zero. On the new roms this isn't true so when you peek there you get a non-zero value. So, if you run on the new roms, the second set of assignments will be done, which is just what you need. We have currently chosen seven variables, all starting with "Q". We think that they cover about 99% of what is likely to be done. If you have other suggestions or contributions, please send them in.

VARIABLE	OLD	NEW	Description of location
QK	525	158	Number of characters in the keyboard queue. (K=Keys in queue).
QL	245	216	Current line number of cursor (handy for vertical tabs). (L=Line number).
QM	134	52	PEEK(QM)+256*PEEK(QM+1) tells how much memory is available. (M=memory size).
QQ	234	205	Quote mode flag - zero if out of quotes, and non-zero if in quotes. (Q=Quote mode).
QS	516	152	If zero, shift is not pressed. Non-zero indicates that shift is pressed.
QV	1	2	Not a location. Tells which version of the rom is being used.

MODS FOR NEW ROMS AVAILABLE

If you have back issues of Cursor, and have gotten a new Pet that has the new Roms, or have upgraded your old Pet with the new roms, you will want to get the sheet of modifications that we have been working on. Although we originally made some mistakes, we now have a good set of changes for our older programs so that they will work on either set of roms automatically. If you would like to get the list, send a self addressed, stamped envelope to us. To expedite mail handling, please mark the outside of your letter "NEW ROMS".

RENEWALS

Yes, it is renewal time for many of our original subscribers. We have included a renewal form for your convienience. It is a little hard to believe that a year has gone by (actually, it sometimes seems like five years...) We hope that you have enjoyed Cursor - and our mail indicates that most people have. We plan to continue with the same high quality software at a reasonable price. If you like Cursor, we hope that you will tell a friend or two about the magazine, and maybe even encourage them to subscribe! Please PLEASE include your subscriber number from your mailing label when you renew, so that we don't confuse you with a new subscription. You subscriber number is the number that follows your name, or in the case of a business, it may be on a line by itself before your name.

We'd like to pass along a special "Thank You" for those of you that were early subscribers. Your support has been fantastic! We think that the community of Pet users is very special, and we have enjoyed serving you. We look forward to continuing to provide some of the best software available for the Pet.

MAZE CORRECTIONS

We blew it. We have sent out a number of copies of Maze (CURSOR #8) that we had "corrected" for the new roms. Naturally, we should have made it work on either set of roms. Here are the changes:

```
Line 10 Rem As of July 3 1979
In line 100 and 110, change GOSUB 800 to GOSUB 900
Delete line 120
In line 800, delete "QM=52:"
Add line 900 QM=134: QK=525: IF PEEK(50000) THEN QM=52: QK=158
Add line 910 GOTO 810
```